

Comparative Performance Analysis of Reactive Routing Protocols in Wireless Ad hoc Networks using Varying Pause Time

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ABSTRACT

A Wireless Ad hoc Networks consists of mobile platforms (e.g., a router with multiple hosts and wireless communications devices) here in simply referred to as "nodes" which are free to move about arbitrarily; thus, the network topology which is typically multi-hop may change randomly and rapidly at unpredictable times, and may consist of both bidirectional and unidirectional links. So that the development of dynamic routing protocols that can efficiently find routes between two communications nodes when nodes are mobile is very challenging task. To accomplish this, a number of ad hoc routing protocols had been proposed and implemented. Performance evolution of the protocols is the key step before selecting a particular protocol. In this paper, the performance is compared on Ad-hoc On-Demand Distance Vector (AODV) and Dynamic MANET on Demand (DYMO) at application layer by varying number of nodes using QualNet 5.0.2 simulator. The average jitter, end-to-end delay, and throughput, are the common measures used for the comparison of the performance of above protocols. The experimental results show that overall performance of AODV routing protocol is better than DYMO routing protocol as increase the pause time in a particular area.

Keywords

AODV, DYMO, QualNet 5.0.2, Wireless Ad hoc Networks

1. INTRODUCTION

Wireless ad hoc networks are collection of wireless nodes sharing a wireless channel without any base station or centralized control. These nodes can act as a router as well as both end system. It has flexible network architecture. There are variable routing paths to provide communication in case of limited wireless connectivity range and resources constraints. Due to the rapidly changing the topology, routing in wireless ad hoc networks can be challengeable task. A considerable amount of research has been done in this area, and number of routing protocols have been developed [2, 3]. Routing protocol is the way to deliver the message from source to the precise destination. Routing protocols can be categorized as proactive routing protocol also known as table driven routing protocols and reactive routing protocols also known as on demand routing protocol [4, 5]. Each of these types of protocols may behave differently on different wireless scenarios. Hence, the performance evaluation is main issue to know its behaviour in wireless environment. Researchers emphasized on the different major performance matrices i.e. Average Jitter, Average End-to-End Delay, and Throughput for comparison of performance of AODV and DYMO protocols. The rest of the paper is organized as follows. Section 2 we present

literature review. Section 3 discusses the simulation results. Section 4 gives the conclusion of the experimental results.

2. LITERATURE REVIEW

A lots of research work has been done in the field of Wireless Ad hoc Networks routing protocols. Different routing protocols were simulated in different kind of simulators. Here we will discuss different research papers about Wireless Ad hoc Networks routing protocols performance. In this paper work we will simulate two Wireless Ad hoc Networks reactive routing protocols with the effect of QoS parameter i.e. pause time using Qualnet simulator 5.0.

The DSR normally performs better than AODV except in static networks in which they show a similar behaviour. Comparing AODV and OLSR, there are several scenarios in which AODV perform worse than OLSR, typically when longer routes are allowed [8]. [9] have seen that proactive routing protocol OLSR performed better than the reactive routing protocols AODV, DSR and TORA for medium size MANETs.[10] show that, at low network load AODV performs better in case of packet delivery fraction but it performs badly in terms of average end-end delay, routing load and routing packets. At high network load and mobility OLSR performs better with respect to packet delivery fraction.Authors [11] have used RWP (random waypoint) mobility model and performed simulations by using QualNet version 5.0 Simulator from Scalable Networks. Performance of OLSR and LAR1 is evaluated based on Average end to end delay, Packet delivery ratio, Throughput and Average Jitter. OLSR has shown better performance than LAR1 in terms of average end-to-end delay and average jitter due to its proactive nature and LAR1 shown better performance than OLSR in terms of packet delivery fraction and throughput due to less overhead in route discovery by using location information of mobile nodes. In reference of [12] The AODV and DYMO (Reactive), OLSR (Proactive) and ZRP (hybrid) protocols are compared for battery models Duracell AA(MX- 1500),Duracell AAA(MN-2400),Duracell AAA(MX-2400), Duracell C-MN(MN-1400),Panasonic AA standard using Qualnet as a Simulation tool. In all the simulation results OLSR outperforms the other protocols.

3. RESULTS AND DISCUSSION

The Our aim of this simulation study is to analyze the performance of AODV and DYMO wireless ad hoc routing protocol on the basis of varying pause time. The simulations have been performed using QualNet version 5.0.2 software that provides scalable simulations of wireless ad hoc networks. The simulation has carryout in terrine dimensions 500X500 with 100 nodes placed randomly and duration fixed

200 sec for each of simulation. The nodes moved following the random waypoint mobility model with 1 seed value and minimum and maximum speed of nodes are 2 and 20 metres per second, with from 0 to 20 pause time respectively. The MAC protocol is used the IEEE 802.11b with the 2.4 GHz channel frequency. The nodes have application run on CBR (constant bit rate) traffic. We are taking 1048 bytes size for the each packet to send the 5,000 packets in the said environment with the interval of 50 milliseconds.

3.1 Pause Time Analysis

In this analysis the varying the pause time as 0, 5, 10, 15, and 20 s for 100 nodes placed randomly where as terrain dimension and simulation time are fixed at 30s, 500X500 and 200s respectively with 3 random CBR. The performance plots i.e. Pause time Vs Average jitter, Pause time Vs Average End-to-End delay, and Pause time Vs Throughput, are shown fig 1(a), (b), and (c), respectively. In terms of average jitter the AODV routing protocol is perform better than DYMO routing protocol as shown in fig. 1(a) on increase pause time. From fig. 1(b) AODV routing protocol has less value of average end-to-end delay as compare to DYMO routing protocol from 0 to 5 pause time. But as increase pause time after 5s, DYMO routing protocol has less value of average end-to-end delay. In case of throughput: AODV outperform than DYMO routing protocol on varying the pause time.

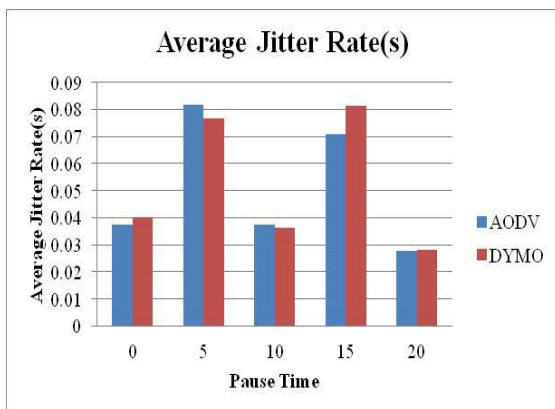


Fig. 3(a): Comparison of OLSR and STAR Protocols with respect to Nodes Vs Average Jitter in Application Layer.

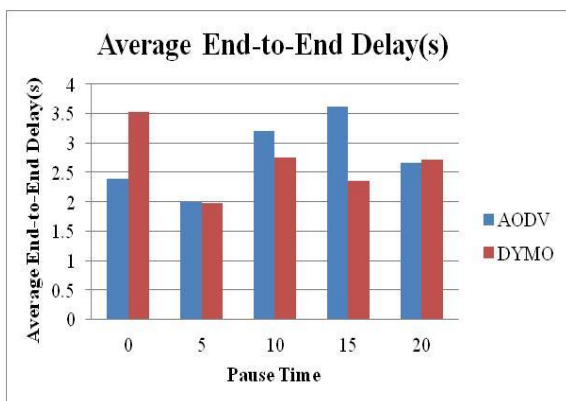


Fig. 3(b): Comparison of OLSR and STAR Protocols with respect to Nodes Vs Average End – to-End Delay in Application Layer

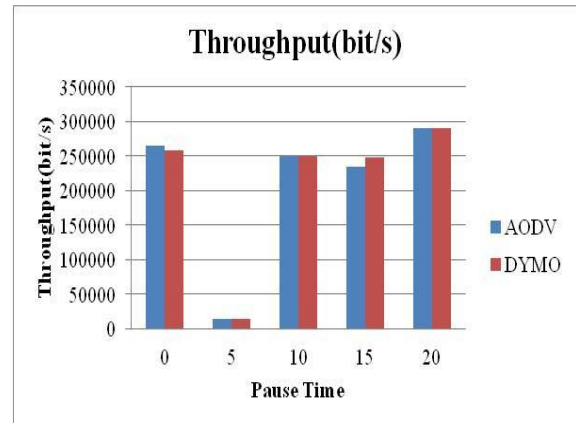


Fig. 3(c): Comparison of OLSR and STAR Protocols with respect to Nodes Vs Throughput in Application Layer

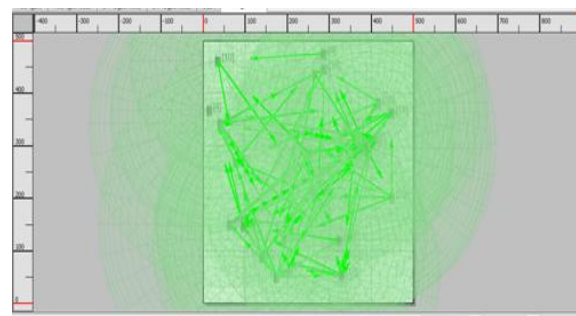


Fig. 3(d) Snapshot of 100 nodes placement network in QualNet 5.0.2 Simulator

4. CONCLUSION

This paper compares the performance of two reactive routing protocols according to the different performance matrices i.e. Average Jitter, Average End-to-End Delay, and Throughput on the basis of varying pause time. In considered mobility scenarios, Overall performance of AODV routing protocol is better as compare to DYMO routing protocol.

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